UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/596,613	06/19/2006	Niclas Wiberg	P18737-US1	8421

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EXAMINER
HAIDER, SYED

ART UNIT	PAPER NUMBER
2611	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

	Application No.	Applicant(s)
Office Action Summary	10/596,613	WIBERG ET AL.
	Examiner	Art Unit	
	SYED HAIDER	2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on <u>10 September 2009</u>.

2a)☒ This action is **FINAL**.   2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) <u>26-39, and claim 46,47,</u> is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) <u>26-38, and claims 46,47,</u> is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All   b)☐ Some * c)☐ None of:

        1.☐ Certified copies of the priority documents have been received.

        2.☐ Certified copies of the priority documents have been received in Application No. _____ .

        3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☐ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☐ Information Disclosure Statement(s) (PTO/SB/08)
    Paper No(s)/Mail Date _____ .

4)☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____ .

5)☐ Notice of Informal Patent Application

6)☐ Other: _____ .

DETAILED ACTION

Response to Arguments

1.   Applicant's arguments filed 09/10/2009 have been fully considered but they are not persuasive. Applicant argues (see page 6 of remarks/arguments) Sampath does not disclose sub-dividing the channel filter function into two or more parts, a function of which representing an approximation of the estimated full channel filter function.

2.   The Examiner Respectfully disagrees with the applicant. As can be seen from the Sampath Figure 5, response Estimator is being divided by into two or more parts by Adaptive interpolator, and response estimator 540 represents an approximation of the estimated full channel filter, to further support in Sampath Figure 6, which shows a separator which divide the Adaptive channel estimator into two parts (Sampath Fig. 6:620:630:640).

Further the Applicant(s) is/are reminded that the rejection is made based on the entire content of the cited prior art.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for

all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described
> as set forth in section 102 of this title, if the differences between the subject matter sought to
> be patented and the prior art are such that the subject matter as a whole would have been
> obvious at the time the invention was made to a person having ordinary skill in the art to which
> said subject matter pertains. Patentability shall not be negatived by the manner in which the
> invention was made.

Claims 1-47 and 49-50 are rejected under 35 U.S.C. 103(a) as being

unpatentable over Sampath (Publication# US 2003/0012308) and further in view

of Moose (Publication# 2002/0065047).

As per Claim 26, Sampath discloses, a method in a receiver unit to

receive communication signals from a transmitter unit via a multi-path channel,

said method comprising the steps of:

estimating parameters of a channel filter function of said channel

(Sampath, Fig. 4:420) from said received communication signals (Sampath, Fig.

1:131) from the transmitter unit (Sampath, Fig. 1:111);

sub-dividing the channel filter function into two or more parts (Sampath,

paragraph#26 explains that the base station controller 102 controls the transmit

antenna 111 to transmit a signal ("transmitted signal") encoded using an

orthogonal frequency division multiplexing (OFDM) protocol. In OFDM systems,

the bandwidth is divided into many narrow frequency bands ("tones")), a function

of which representing an approximation of the estimated full channel filter

function (Sampath, Fig. 4:420 Adaptive channel estimator which represents the

full channel filter function);

representing the complex parameters (Sampath, paragraph#27 explains that "the

signal as received ("received signal") by the receive antenna 131 has a delay

spread, DS1, due to multipaths. The delay spread can range from less than 75

nanoseconds to more than 20 microseconds, depending on the environment. In a

more moderate environment the delay spread may be on the order of 5

microseconds" which are complex parameters) of at least a selection of said

parts of the channel filter function as actual parameter values (Sampath,

paragraph#28 explains that Channel estimators estimate the training channel

responses for the training symbols, and interpolate the training channel

responses to estimate the data channel responses for the data symbols.),

composing a channel measurement message (Sampath, Fig. 4:420, Adaptive

channel estimator) to be transmitted to the transmitter unit (Sampath, Fig. 1:111)

of a portion including said parameter representations (Sampath, paragraph#27

explains that the signal as received ("received signal") by the receive antenna

131 has a delay spread, DS1, due to multipaths. The delay spread can range

from less than 75 nanoseconds to more than 20 microseconds, depending on the

environment. In a more moderate environment the delay spread may be on the

order of 5 microseconds) and a portion indicating the manner of representing

said parameters (Sampath, paragraph#28 explains that Channel estimators

estimate the training channel responses for the training symbols, and interpolate

the training channel responses to estimate the data channel responses for the

data symbols).

Sampath does not disclose incremental values indicating the difference to

a reference value.

Moose discloses incremental values indicating the difference to a

reference value (Moose, paragraph#116 explains that "an additional feature of

the present invention is that the pilot tone tracking circuitry can adjust each

OFDM symbol for residual frequency offset error. The pilot tone tracking circuitry

also adjusts each symbol for differences in the transmitter and receiver sampling

rates (nominally 20 MHz) and/or residual symbol timing error" which indicates

the difference).

At the time of the invention, it would have been obvious to one ordinary

skill in the art to modify Sampath teachings by implementing the amplitude and

phase values to Adaptive channel estimation, as taught by Moose.

The motivation would be to improve the communication system operates

to transmit communication signals having informational contents and other

characteristics generated at, or applied or provided to, a transmitter upon the

communication channel.

As per claim 27, Sampath in view of Moose disclose the method according

to claim 26, wherein said function performs a summing of the sub-divided parts

(Sampath, Fig. 5:580, which add the selected delay) of the channel filter function

(Sampath, Fig. 4:420).

As per Claim 28, Sampath in view of Moose discloses the method

according to claim 26, wherein the sub-divided parts of the channel filter function

comprise channel information of a ranked degree of significance (Sampath,

paragraph#26 explains that In OFDM systems, the bandwidth is divided into

many narrow frequency bands ("tones"). The information to be transmitted

("transmitted information") is encoded into a sequence of data symbols and

modulated onto data tones).

As per Claim 29, Sampath in view of Moose discloses the method

according to claim 26, wherein the channel filter function is represented as a

channel impulse response in the time-domain (Sampath, paragraph#62 explains

that well-known time-domain correlation techniques may be used to compute

delay spread. For example, the training symbols as transmitted (known at the

receiver) can be correlated with the training symbols as received. The location of

the peaks in the correlation indicates a multipath for the channel).

As per Claim 30, Sampath discloses the method according to claim 29,

wherein the complex parameters (Sampath, paragraph#27 explains that the

signal as received ("received signal") by the receive antenna 131 has a delay

spread, DS1, due to multipaths. The delay spread can range from less than 75

nanoseconds to more than 20 microseconds, depending on the environment. In a

more moderate environment the delay spread may be on the order of 5

microseconds) of the channel impulse response are reproduced as amplitude

and phase values.

Sampath does not disclose channel impulse response are reproduced as

amplitude and phase value.

Moose discloses channel impulse response are reproduced as amplitude

and phase value (Moose, paragraph#24, explains that each data sub-carrier is

phase and or amplitude modulated independently).

At the time of the invention, it would have been obvious to one ordinary

skill in the art to modify Sampath teachings by implementing the amplitude and

phase values to Adaptive channel estimation, as taught by Moose.

The motivation would be to improve the communication system operate to

transmit communication signals having informational contents and other

characteristics generated at, or applied or provided to, a transmitter upon the

communication channel.

As per Claim 31, Sampath in view of Moose discloses the method

according to claim 29, wherein the primary sub-divided filter function (Sampath,

paragraph#26 explains that the base station controller 102 controls the transmit

antenna 111 to transmit a signal ("transmitted signal") encoded using an

orthogonal frequency division multiplexing (OFDM) protocol. In OFDM systems,

the bandwidth is divided into many narrow frequency bands ("tones")) includes a

representation of one or more of the most significant channel components

(Sampath, paragraph#65 explains that If the correlation is between zero and

.rho.0, the delay spread is large and the selector 580 generates selects the data

channel responses on the bus 571).

As per claim 32, Sampath in view of Moose discloses the method

according to claim 31, wherein the most significant channel component is the

component having the shortest delay (Sampath, Fig. 5:580, selector which can

selects the shortest delay).

As per claim 33, Sampath disclose the method according to claim 26,

wherein the channel filter function is represented (Sampath, Fig. 4:420)

Sampath does not disclose a channel frequency response in the

frequency-domain.

Moose discloses a channel frequency response in the frequency-domain

(Moose paragraph#35 explains that The sample values 600 are frequency

shifted by the fine fractional frequency estimate 610 obtained in the first iteration

so that any residual frequency offset will be an integer multiple of the sub-carrier

frequency spacing).

At the time of the invention, it would have been obvious to one ordinary

skill in the art to modify Sampath teachings by implementing the amplitude and

phase values to Adaptive channel estimation, as taught by Moose.

The motivation would be to improve the communication system operate to transmit communication signals having informational contents and other characteristics generated at, or applied or provided to, a transmitter upon the communication channel.

As per claim 34, Sampath in view of Moose disclose the method according to claim 33, wherein a complex parameter of the channel frequency response (Moose, paragraph#38 explains that this required channel transfer function is in fact the channel transfer function corresponding to the correct integer frequency offset determined during the processing described above. This estimated transfer function is used to correct the sub-carrier amplitudes and phases following FFT demodulation and prior to decoding) is reproduced at least as an amplitude value (Moose, paragraph#72 explains that the multi-path channel may introduce additional phase shifts and amplitude variations onto the sub-carriers.) and optionally by an additional phase value (Moose, paragraph#72 explains that the multi-path channel may introduce additional phase shifts and amplitude variations onto the sub-carriers.).

As per claim 35, sampath discloses the method according to claim 26, wherein the complex parameters of said parts of the channel filter function are represented by their actual values in case of a significant change (Sampath, paragraph#27 explains that the signal as received ("received signal") by the receive antenna 131 has a delay spread, DS1, due to multipaths. The delay

spread can range from less than 75 nanoseconds to more than 20 microseconds,

depending on the environment. In a more moderate environment the delay

spread may be on the order of 5 microseconds)

Sampath does not disclose compared to a previous reference value.

Moose disclose compared to a previous reference value (Moose,

paragraph#43 explains that a new estimate of frequency offset is obtained from

the previous value at step 813 and the error and is applied to the subsequent

OFDM symbol at step 815 prior to demodulation. The coefficient of the first order

term of the line fit to the data is the average slope of the phase change versus

sub-carrier frequency at step 809).

At the time of the invention, it would have been obvious to one ordinary

skill in the art to modify Sampath teachings by implementing the amplitude and

phase values to Adaptive channel estimation, as taught by Moose.

The motivation would be to improve the communication system operates

to transmit communication signals having informational contents and other

characteristics generated at, or applied or provided to, a transmitter upon the

communication channel.

As per Claim 36, Sampath in view of Moose discloses the method

according to claim 35, wherein the reference value corresponds to a previous

channel parameter representation (Moose, paragraph#43 explains that a new

estimate of frequency offset is obtained from the previous value at step 813 and

the error and is applied to the subsequent OFDM symbol at step 815 prior to

demodulation. The coefficient of the first order term of the line fit to the data is the average slope of the phase change versus sub-carrier frequency at step 809).

As per Claim 37, Sampath in view of Moose disclose the method according to claim 37, wherein the modeled estimate is a interpolation (Moose, paragraph#80 explains that as the channel transfer function does not change randomly between adjacent sub-carriers. Accordingly, the channel response at an intermediate frequency can be accurately estimated from the response at adjacent nearby frequencies. In any event, a more accurate interpolation algorithm can be used than (24), if necessary.) Of the channel filter function from the complex parameters of the channel filter function (Sampath, paragraph#27 explains that the signal as received ("received signal") by the receive antenna 131 has a delay spread, DS1, due to multipaths. The delay spread can range from less than 75 nanoseconds to more than 20 microseconds, depending on the environment. In a more moderate environment the delay spread may be on the order of 5 microseconds).

As per claim 38,Sampath in view of Moose disclose the method according to claim 35, wherein the reference value (Moose, paragraph#43 explains that a new estimate of frequency offset is obtained from the previous value at step 813 and the error and is applied to the subsequent OFDM symbol at step 815 prior to demodulation. The coefficient of the first order term of the line fit to the data is the average slope of the phase change versus sub-carrier frequency at step 809)

corresponds to a modeled estimate of the channel filter function (Sampath,

paragraph#24 explains that the channel estimation is adapted according to the

estimated delay spread to produce more accurate channel estimates in a broad

range of delay spread environments. More accurate channel estimation generally

reduces error rates for a given data transmission rate and/or increases data

transmission rates for given error rate).

As per Claim 39, Sampath in view of Moose disclose the method

according to claim 37, wherein said modeled estimate (Sampath, paragraph#24

explains that the channel estimation is adapted according to the estimated delay

spread to produce more accurate channel estimates in a broad range of delay

spread environments. More accurate channel estimation generally reduces error

rates for a given data transmission rate and/or increases data transmission rates

for given error rate) of the channel filter function has been received by the

transmitter unit (Sampath, Fig. 1:111, which will receive the accurate estimation

of channel).

As per Claim 46, Sampath discloses an apparatus for processing

communication signals received via a multipath channel, comprising:

means for estimating parameters of a channel filter function of said channel

(Sampath, Fig. 4:420) from said received communication signals (Sampath, Fig.

1:131) from the transmitter unit (Sampath, Fig. 1:111);

means for sub-dividing the channel filter function into two or more parts

(Sampath, paragraph#26 explains that the base station controller 102 controls

the transmit antenna 111 to transmit a signal ("transmitted signal") encoded

using an orthogonal frequency division multiplexing (OFDM) protocol. In OFDM

systems, the bandwidth is divided into many narrow frequency bands ("tones")),

a function of which representing the estimated full channel filter function

(Sampath, Fig. 4:420, Adaptive channel estimator which represents the full

channel filter function);

means for representing the complex parameters (Sampath, paragraph#27

explains that the signal as received ("received signal") by the receive antenna

131 has a delay spread, DS1, due to multipaths. The delay spread can range

from less than 75 nanoseconds to more than 20 microseconds, depending on the

environment. In a more moderate environment the delay spread may be on the

order of 5 microseconds, which are complex parameters) of at least a selection

of the sub- divided channel filter function as actual parameter values (Sampath,

paragraph#28 explains that Channel estimators estimate the training channel

responses for the training symbols, and interpolate the training channel

responses to estimate the data channel responses for the data symbols); and,

means for composing a channel measurement message (Sampath, Fig. 4:420,

Adaptive channel estimator) to be transmitted to the transmitter unit (Sampath,

Fig. 1:111) including said set of parameter representations and a header field

indicating the manner of representing said parameters (Sampath, paragraph#28

explains that Channel estimators estimate the training channel responses for the

training symbols, and interpolate the training channel responses to estimate the

data channel responses for the data symbols).

Sampath does not disclose incremental values indicating the difference to

a reference value.

Moose discloses incremental values indicating the difference to a

reference value (Moose, paragraph#116 explains that "an additional feature of

the present invention is that the pilot tone tracking circuitry can adjust each

OFDM symbol for residual frequency offset error. The pilot tone tracking circuitry

also adjusts each symbol for differences in the transmitter and receiver sampling

rates (nominally 20 MHz) and/or residual symbol timing error" which indicates

the difference).

At the time of the invention, it would have been obvious to one ordinary

skill in the art to modify Sampath teachings by implementing the amplitude and

phase values to Adaptive channel estimation, as taught by Moose.

The motivation would be to improve the communication system operates

to transmit communication signals having informational contents and other

characteristics generated at, or applied or provided to, a transmitter upon the

communication channel.

As per 47, Sampath in view of Moose disclose the apparatus according to

claim 46, which is integrated in mobile user equipment (Moose, Fig 4:405,

integrator).

Conclusion

1. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of

time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire

THREE MONTHS from the mailing date of this action. In the event a first reply is

filed within TWO MONTHS of the mailing date of this final action and the advisory

action is not mailed until after the end of the THREE-MONTH shortened statutory

period, then the shortened statutory period will expire on the date the advisory

action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be

calculated from the mailing date of the advisory action. In no event, however, will

the statutory period for reply expire later than SIX MONTHS from the mailing

date of this final action.

Any inquiry concerning this communication or earlier communications from

the examiner should be directed to SYED HAIDER whose telephone number is

(571)270-5169. The examiner can normally be reached on Monday thru Friday

8:00AM to 5:00 PM Est.

If attempts to reach the examiner by telephone are unsuccessful, the

examiner's supervisor, David Payne can be reached on 571-272-3024. The fax

phone number for the organization where this application or proceeding is

assigned is 571-273-8300.

Information regarding the status of an application may be obtained from

the Patent Application Information Retrieval (PAIR) system. Status information

for published applications may be obtained from either Private PAIR or Public

PAIR. Status information for unpublished applications is available through

Private PAIR only. For more information about the PAIR system, see http://pair-

direct.uspto.gov. Should you have questions on access to the Private PAIR

system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-

free). If you would like assistance from a USPTO Customer Service

Representative or access to the automated information system, call 800-786-

9199 (IN USA OR CANADA) or 571-272-1000.

/SYED HAIDER/
Examiner, Art Unit 2611

/David C. Payne/
Supervisory Patent Examiner, Art Unit 2611